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AUTHOR Karle-Weiss, Adria; And Others
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ABSTRACT

Teacher effectiveness literature has supported the contention that a recurring theme in examining the qualities and attributes that constitute effective teachers is the use of humor in the classroom. However, most of the research did not appear to consider the potential differential effects on the students' perceptions of teachers' use of humor when taking into consideration the gender of the instructor. One study (Karle-Weiss, Newman, 1990) found that in a small sample of preservice teachers (N=70), there was a significant interaction in that female instructors who used humor were rated significantly higher on professionalism. This study, using a sample group of 255 preservice teachers, replicated the previous study, adding a control for appropriateness of humor. The survey instrument used was the teacher evaluation form in use at the University of Akron, Ohio, with four items added: instructor's sense of humor, amount of material used, appropriateness of humor, and professionalism of the instructor. While the overall general conception that humor is related to perceived instructor effectiveness was strongly supported, the expected interaction between instructor gender and humor in predicting perceived instructor effectiveness appeared to be somewhat questionable. Data resulting from the study are displayed in 17 tables. (JD)

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THE RELATIONSHIP BETWEEN HUMOR AND TEACHER EFFECTIVENESS AS PERCEIVED BY PRESERVICE TEACHERS: IS THERE A CASE FOR GENDER BIAS?

Adria Karle-Weiss
Isadore Newman
Carole Spitzer Newman
Robert J. Sovchik

The University of Akron

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The quality of teaching in America is suspect. The critical reports of the 1980s cry out for more effective teachers (Boyer, 1983; Goodlad, 1984). Although concensus about what totally constitutes an effective teacher is debatable (Cruickshank, 1986), nonetheless, certain recurring themes pervade the effective teaching literature.

Critical teacher shortages and teacher surpluses of the 1960s and 1970s were the provocation for the filling of teacher positions with available bodies (Kluender, 1984; Weaver, 1981). Entrance to colleges of education was made more available and credentialing practices became more lax (Weaver, 1981). The ebb and flow of the need for teachers outweighed the need for inflexibly high standards. It is believed that resulting conditions of this period have affected education's ability to attract academically talented people into the profession (Weaver, 1981). This critical period of instability of teacher availability also led to the belief that there was consistent student exposure to possibly less-than-qualified educators. However, with the onslaught of the critical reports of the 1980s (Boyer, 1984; Goodlad, 1984; Sizer, 1983), attention focused on the quality of the educators as opposed to just the quantity. The call for reform and improvements via these critical reports of the 1980s centered new focus on the effective school and, subsequently, the effective teacher. The various commissions and groups, e.g. Carnegie, Holmes, stated improvement of teacher education was essential in order to upgrade the level of ability and commitment of teachers and in order to produce effective teachers.

In the attempt to continually improve the educational process, researchers have strived to establish factors that can be used to identify effective teaching and effective teachers. Studies of effective teaching began about 1900. As early as 1941, Barr comprised a list from the literature that had 12 personal qualities believed to be essential for effective teaching. The 12 qualities were resourcefulness, intelligence, emotional stability, considerateness, buoyancy, objectivity, drive, dominance, attractiveness, refinement, cooperativeness, and reliability. Symonds and Durek (1956), at Columbia University, identified four factors using the Rorschach test that described teachers who are highly effective. They stated that teachers who are highly effective have demonstrated the following abilities: superior personality organization, good judgment and reasoning, capacity to relate to others, and lack of aggressiveness.

In a somewhat different approach, Wright and Alley (1977) attempted to identify the "ideal" teacher from the perception of the student as well as from the perception of the teacher. It was clear from the data collected by the researchers that the students and the teachers did not agree upon the same factors as most important in identifying the ideal (effective) teacher. The items that the students rated as significantly more important than the teachers did were: is fun (it appears that the students' use of fun in describing their teachers parallels our conception of a teacher with high humor), tells me what I do wrong, is a good dresser, is female, and has good physical build. There were also four factors that the students rated as significantly less important than the teacher did. They were: is strict, enjoys teaching me, is dependable, and has lots of energy.

The final analysis of the students' perceptions of a teacher who would be considered effective revealed that the teacher would be fair, intelligent, friendly, fun, and not show favoritism. In "Age, Sex, and Attractiveness as Factors in Student Ratings of Teachers: A Developmental Study," Goebel and Cashen (1979) noted that students' assessment of their educational experiences had validity, but their judgment regarding teachers was usually limited to personal characteristics rather than teaching skill and/or knowledge. Additionally, they found that students did not always receive the best education from the teachers that they rated the highest. Despite the conflict in these assessments, Goebel and Cashen gave attention to the increase in the use of student ratings. It is their opinion that the ratings do yield quantifiable data which can help to simplify important decisions that need to be made regarding teacher quality. Mergendoller and Packer (1985) put forth that if the right school and classroom interventions are to be made (with regard to identifying effective teachers), a complete understanding of student perceptions in addition to teacher/educator perceptions is necessary.

The recurring themes in the teacher effectiveness literature support the contention that there are many and varied qualities and attributes that constitute effective teachers. One such recurring theme is the use of humor in the classroom. And although, according to Downs, Javidi, and Nussbaum (1988), humor in the classroom is a controversial subject, there does appear to be a link between a teacher's sense of humor and the perception of effective teaching (Bryant, Comisky, Crane, and Zillman, 1980). Some may argue that using humor in the classroom may actually detract from the perceived professionalism of an

individual instructor. Certain literature appears to support the contention that some topics for humor are clearly off-base in the classroom situation (Bryant et al., 1979, 1980). However, in a study of profiles of exceptional educators, Reavis (1988) found that a sense of humor was present in wide variety of successful teaching situations. "Shared laughter is a powerful way to reinforce learning" (Korobkin, 1989, p. 154).

Most of the reported research in the literature on humor and effective teaching did not appear to consider the potential differential effects on the students' perceptions of teachers' use of humor when taking into consideration the gender of the instructor. However, in an earlier study by Karle-Weiss and Newman (1990), the interaction of humor with gender was examined. This study found that in a small sample (N = 70) of preservice teachers, there was a significant interaction such that female instructors who used humor were rated significantly higher on professionalism. However, a variety of methodological problems existed. One was that there was no control for appropriateness of humor and it was possible that females scored higher on professionalism because females may use more appropriate humor while males may use humor considered to be risque. Secondly, the sample size was small, as was the number of instructors (N = 4). Therefore, this study must be viewed as a pilot and heuristic in value. Also, in this previous study by Karle-Weiss and Newman (1990), a factor analysis of the questions indicated that the humor and professionalism items loaded heavily on factor one (characteristics of the instructor) of the two-factor solution. The second factor was course organization.

Given these findings from a heuristic point of view, it was believed that a replication of this study involving a larger number of subjects and instructors and with a control for appropriateness of humor could be more effectively interpreted. This was the impetus for the current study.

Methods

Description of the Sample

For use in this study, the sample group consisted of 255 preservice teachers enrolled in various education classes in elementary and secondary education in the College of Education at The University of Akron, Akron, Ohio. Over 80% (82.5%) were female students, and 17.5% were male students.

Data Gathering

Prior to administration of the survey instrument, permission was granted by both the University and individual instructors to administer the survey. The various course instructors administered the survey to their classes. The procedure was that the directions at the top of the survey (see survey instrument) were read aloud and a request for questions was made. It was understood that participation was not mandatory and none of the students declined to participate.

Instrument

The survey instrument used was the teacher evaluation form in use at The University of Akron for the past five years. Only four items were added to better address the research questions being investigated. These items were: (6) Instructor's sense of humor, (8) Amount of material used, (11) Appropriateness of humor, and (12) Professionalism of the instructor.

Findings

A factor analysis of the scale produced a two-factor solution. Factor one was characteristics of the instructor and factor two was course structure. These two factors accounted for 75% of the trace (see Table 1). An analysis was run on four dependent variables. Each of the above two factors was used as a dependent variable as well as survey item 12, Professionalsim, and survey item 13, Overall rating of the instructor (see Appendix A). Four predictor regression equations were run predicting each of the dependent variables.

The regression equation tested for unique variance accounted for in the ratings of the instructor's humor in predicting the factor of evaluating course structure when controlling for instructor gender and appropriateness of humor. Humor was found to account for a significant amount of unique variance ($p = .025$) (see Table 2).

The second equation predicting the factor of evaluation of course structure tested to see if the gender of the instructor interacted with humor ratings of the instructor when controlling for appropriateness of humor. This was found to be nonsignificant ($p = .08$) (see Table 3).

The third predictor equation tested the interaction of the student's gender with humor ratings of the instructor in predicting the factor of evaluation of course structure while controlling for appropriateness of humor. This was found to be nonsignificant ($p = .44$) (see Table 4).

The fourth predictor equation tested to see if there was a curvilinear relationship between the ratings of humor and the factor of evaluation of course structure while controlling for appropriateness of humor. This was found to be nonsignificant ($p = .16$) (see Table 5).

These same four patterns of equations were repeated exactly for predicting the factor of evaluation of the instructor (see Tables 6, 7, 8, and 9). Table 6 indicates that there is a highly statistical significant relationship ($p = .0001$) between the ratings of the instructor's humor and the evaluation of the instructor while controlling for appropriateness of humor. Table 7 indicates no significant relationship between students' gender and humor ratings while controlling for appropriateness of humor. Table 8 indicates no significant interaction between instructor gender and humor ratings while controlling for humor appropriateness. Table 9 indicates no significant second degree curvilinear relationship between humor ratings and evaluation of the instructor when controlling for humor appropriateness ($p = .36$).

Ratings of instructor humor were significantly positively related to ratings of professionalism of the instructor while controlling for gender of the instructor and appropriateness of humor ($p = .0002$) (see Table 10). There is no significant interaction between gender of the instructor and humor ratings while controlling for humor appropriateness when predicting professionalism ($p = .67$) (see Table 11). Similarly, as one can see from Table 12, there is no significant interaction between student gender and rating of the instructor's humor in predicting professionalism when controlling for humor appropriateness ($p = .95$). Interestingly, there was a significant curvilinear relationship between humor ratings of the instructor and professionalism ($p = .02$) while controlling for appropriateness of humor (see Table 13).

The last four equations employed the overall rating of the instructor as the criterion variable. Humor was found to be highly statistically related to the overall rating of the instructor while controlling for gender of the instructor and appropriateness of humor ($p = .0001$) (see Table 14). Table 15 indicates a significant interaction between the gender of the instructor with humor in predicting the overall ratings of the instructor; female instructors rated higher in humor proportionally were also rated higher on overall evalu-

ation (p=.007). Table 16 indicates no significant interaction between gender of the student and humor rating in predicting overall rating of the instructor while controlling for appropriateness of humor (p=.94). The curvilinear relationship of humor to the overall rating of the instructor while controlling for appropriateness of humor just missed being significant (p=.54). (see Table 17).

Discussion

It appears to the investigators that the overall general conception that humor is related to perceived instructor effectiveness by students has been strongly supported.

The expected interaction between instructor gender and humor in predicting perceived instructor effectiveness seems to be somewhat more questionable. In some hypotheses these interactions were supported in other hypotheses these interactions were not supported, see Tables 3, 8, 11, and 15. In addition, the direction of the interaction indicated that there was an ordinal interaction, with the male line being higher, such that there was a greater positive slope of the female line, compared to that of the male line when predicting the overall rating of instructor, (question 13), while covarying perceived appropriateness of humor.

This study strongly supports the value of further investigation of humor as it relates to instructional effectiveness.

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Circle one **Male** **Female**

Teaching field _____

STUDENT EVALUATION FORM

Using the following scale:

Circle 0 if the question is not applicable
Circle 1 to indicate unsatisfactory
Circle 2 to indicate weak
Circle 3 to indicate average
Circle 4 to indicate strong
Circle 5 to indicate excellent

please rate the instructor on items 1 - 13. Participation in this survey is completely voluntary and anonymous.

1. Clarity of course objectives	0	1	2	3	4	5
2. Suitability of text/educational materials	0	1	2	3	4	5
3. Helpfulness of course assignments	0	1	2	3	4	5
4. Instructor's enthusiasm in teaching course	0	1	2	3	4	5
5. Instructor's sense of humor	0	1	2	3	4	5
6. Encouragement - participation & discussion	0	1	2	3	4	5
7. Stimulation of thinking	0	1	2	3	4	5
8. Amount of material learned	0	1	2	3	4	5
9. Course made interesting by instructor	0	1	2	3	4	5
10. Fairness of grading	0	1	2	3	4	5
11. Appropriateness of humor	0	1	2	3	4	5
12. Overall professionalism of instructor	0	1	2	3	4	5
13. Overall rating of the instructor	0	1	2	3	4	5

TABLE 1

Factor Loading Matrix

	FINSTE	FCEST
Question		
1		.59
2		.72
3		.66
4	.78	
6	.66	
7	.50	
8		.77
9	.61	
10		
13	.73	
NOTE: Eigen Value	4.50	3.08

See Appendix A for Questions

Model: MODEL1
Dependent Variable: FCEST

TABLE 2

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	230.07974	76.69325	18.481	0.0001
Error	243	1008.38989	4.14975		
C Total	246	1238.46964			

Root MSE	2.03709	R-square	0.1858
Dep Mean	11.89879	Adj R-sq	0.1757
C.V.	17.12019		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.357941	0.82518293	7.705	0.0001
MTEACH	1	0.252902	0.26206234	0.965	0.3355
QUES5	1	0.545910	0.24254780	2.251	0.0253
QUES11	1	0.687691	0.19074687	3.605	0.0004

FCEST = $a_0$4 + MTEACH + QUES5 + QUES11 + E

TEST Q5 = 0

FCEST = $a_0$4 + MTEACH + QUES11 + E

Numerator:	21.0218	DF:	1	F value:	5.0658
Denominator:	4.149753	DF:	243	Prob>F:	0.0253

Model: MODEL1
Dependent Variable: FCEST

TABLE 3

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	242.20613	60.55153	14.708	0.0001
Error	242	996.26351	4.11679		
C Total	246	1238.46964			

Root MSE	2.02899	R-square	0.1956
Dep Mean	11.89879	Adj R-sq	0.1823
C.V.	17.05206		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	5.312290	1.02308963	5.192	0.0001
MTEACH	1	3.165803	1.71717966	1.844	0.0665
SEXMTQ5	1	0.167529	0.32705941	0.512	0.6090
SEXFTQ5	1	0.811992	0.28705029	2.829	0.0051
QUES11	1	0.657474	0.19080186	3.446	0.0007

$FCEST = a_0 + MTEACH + SEXMTQ5 + SEXFTQ5 + QUES11 + E$

TEST SEXMTQ5 = SEXFTQ5

$FCEST = a_0 + MTEACH + QUES11 + E$

Numerator:	12.1264	DF:	1	F value:	2.9456
Denominator:	4.116791	DF:	242	Prob>F:	0.0874

Model: MODEL1
Dependent Variable: FCEST

TABLE 4

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	231.01364	57.75341	14.094	0.0001
Error	238	975.28265	4.09783		
C Total	242	1206.29630			

Root MSE	2.02431	R-square	0.1915
Dep Mean	11.87654	Adj R-sq	0.1779
C.V.	17.04460		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.455383	0.94163439	6.856	0.0001
MSTU	1	0.943146	1.97197103	0.478	0.6329
SEXMSQ5	1	0.260959	0.41003289	0.636	0.5251
SEXFSQ5	1	0.607428	0.27220162	2.232	0.0266
QUES11	1	0.647693	0.19466770	3.327	0.0010

$FCEST = a_0 4 + MSTU + SEXMSQ5 + SEXFSQ5 + QUES11 + E$

TEST $SEXMSQ5 = SEXFSQ5$

$FCEST = a_0 4 + MSTU + QUES11 + E$

Numerator:	2.4168	DF:	1	F value:	0.5898
Denominator:	4.097826	DF:	238	Prob>F:	0.4433

Model: MODEL1
Dependent Variable: FCEST

TABLE 5

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	234.12123	78.04041	18.882	0.0001
Error	243	1004.34841	4.13312		
C Total	246	1238.46964			

Root MSE	2.03301	R-square	0.1890
Dep Mean	11.89879	Adj R-sq	0.1790
C.V.	17.08584		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.471434	3.64171184	0.404	0.6865
QUES5	1	3.109776	1.86275163	1.669	0.0963
Q5SQ	1	-0.314133	0.22712687	-1.383	0.1679
QUES11	1	0.685825	0.19016281	3.607	0.0004

$FCEST = a_0 4 + QUES5 + Q5SQ + QUES11 + E$

$TEST\ Q5SQ = 0$

$FCEST = a_0 4 + QUES5 + QUES11 + E$

Numerator:	7.9062	DF:	1	F value:	1.9129
Denominator:	4.133121	DF:	243	Prob>F:	0.1679

Model: MODEL1
Dependent Variable: FINSTE

TABLE 6

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	1367.79496	455.93165	93.163	0.0001
Error	245	1199.00825	4.89391		
C Total	248	2566.80321			

Root MSE	2.21222	R-square	0.5329
Dep Mean	21.69478	Adj R-sq	0.5272
C.V.	10.19701		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.146817	0.91527564	7.808	0.0001
MTEACH	1	-0.145657	0.28323686	-0.514	0.6075
QUES5	1	2.056424	0.26917556	7.640	0.0001
QUES11	1	1.242175	0.20768692	5.981	0.0001

FINSTE = $a_0 U$ + MTEACH + QUES5 + QUES11 + E

TEST QUES5 = 0

FINSTE = $a_0 U$ + MTEACH + QUES11 + E

Numerator:	285.6545	DF:	1	F value:	58.3652
Denominator:	4.893911	DF:	245	Prob>F:	0.0001

Model: MODEL1
Dependent Variable: FINSTE

TABLE 7

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	1371.42242	342.85561	69.983	0.0001
Error	244	1195.38079	4.89910		
C Total	248	2566.80321			

Root MSE	2.21339	R-square	0.5343
Dep Mean	21.69478	Adj R-sq	0.5267
C.V.	10.20242		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.538948	1.15657055	5.654	0.0001
MTEACH	1	1.472277	1.90149487	0.774	0.4395
SEXMTQ5	1	1.854703	0.35705539	5.194	0.0001
SEXFTQ5	1	2.212306	0.32457596	6.816	0.0001
QUES11	1	1.222781	0.20901583	5.850	0.0001

$FINSTE = a_0 4 + MTEACH + SEXMTQ5 + SEXFTQ5 + QUES11 + E$

TEST SEXMTQ5 = SEXFTQ5

$FINSTE = a_0 4 + MTEACH + QUES5 + QUES11 + E$

Numerator:	3.6275	DF:	1	F value:	0.7404
Denominator:	4.899102	DF:	244	Prob>F:	0.3904

Model: MODEL1
Dependent Variable: FINSTE

TABLE 8

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	1352.47162	338.11790	68.692	0.0001
Error	240	1181.34063	4.92225		
C Total	244	2533.81224			

Root MSE	2.21862	R-square	0.5338
Dep Mean	21.64898	Adj R-sq	0.5260
C.V.	10.24813		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.226674	1.06394627	6.792	0.0001
MSTU	1	-0.270852	2.18093594	-0.124	0.9013
SEXMSQ5	1	2.108259	0.44952369	4.690	0.0001
SEXFSQ5	1	2.098827	0.30770320	6.821	0.0001
QUES11	1	1.165225	0.21426492	5.438	0.0001

$FINSTE = a_0 4 + MSTU + SEXMSQ5 + SEXFSQ5 + QUES11 + E$

TEST $SEXMSQ5 = SEXFSQ5$

$FINSTE = a_0 4 + MSTU + QUES11 + E$

Numerator:	0.0018	DF:	1	F value:	0.0004
Denominator:	4.922253	DF:	240	Prob>F:	0.9849

Model: MODEL1
Dependent Variable: FINSTE

TABLE 9

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	1370.55413	456.85138	93.566	0.0001
Error	245	1196.24909	4.88265		
C Total	248	2566.80321			

Root MSE	2.20967	R-square	0.5340
Dep Mean	21.69478	Adj R-sq	0.5282
C.V.	10.18527		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.230422	4.37932796	0.738	0.4614
QUES5	1	4.062664	2.22327179	1.827	0.0689
Q5SQ	1	-0.244224	0.26804359	-0.911	0.3631
QUES11	1	1.215275	0.20788864	5.846	0.0001

$FINSTE = a_0 4 + QUES5 + Q5SQ + QUES11 + E$

TEST $Q5SQ = 0$

$FINSTE = a_0 4 + QUES5 + QUES11 + E$

Numerator:	4.0534	DF:	1	F value:	0.8302
Denominator:	4.882649	DF:	245	Prob>F:	0.3631

Model: MODEL1
Dependent Variable: QUES12

TABLE 10

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	44.97021	14.99007	46.367	0.0001
Error	246	79.52979	0.32329		
C Total	249	124.50000			

Root MSE	0.56859	R-square	0.3612
Dep Mean	4.50000	Adj R-sq	0.3534
C.V.	12.63528		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	2.045844	0.22951565	8.914	0.0001
MTEACH	1	-0.060749	0.07281368	-0.834	0.4049
QUES5	1	0.254688	0.06761194	3.767	0.0002
QUES11	1	0.310424	0.05320540	5.834	0.0001

$QUES12 = a_0 4 + MTEACH + QUES5 + QUES11 + E$

TEST $QUES5 = 0$

$QUES12 = a_0 4 + MTEACH + QUES11 + E$

Numerator:	4.5674	DF:	1	F value:	14.1896
Denominator:	0.323292	DF:	246	Prob>F:	0.0002

Model: MODEL1
Dependent Variable: QUES12

TABLE 11

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	45.02617	11.25654	34.701	0.0001
Error	245	79.47383	0.32438		
C Total	249	124.50000			

Root MSE	0.56955	R-square	0.3617
Dep Mean	4.50000	Adj R-sq	0.3512
C.V.	12.65658		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.975680	0.28529390	6.925	0.0001
MTEACH	1	0.137260	0.48228337	0.285	0.7762
SEXMTQ5	1	0.228787	0.09206210	2.485	0.0136
SEXFTQ5	1	0.272578	0.08026366	3.396	0.0008
QUES11	1	0.308379	0.05352207	5.762	0.0001

$QUES12 = a_0 4 + MTEACH + SEXMTQ5 + SEXFTQ5 + QUES11 + E$

TEST $SEXMTQ5 = SEXFTQ5$

$QUES12 = a_0 4 + MTEACH + QUES11 + E$

Numerator:	0.0560	DF:	1	F value:	0.1725
Denominator:	0.324383	DF:	245	Prob>F:	0.6783

Model: MODEL1
Dependent Variable: QUES12

TABLE 12

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	45.55092	11.38773	35.215	0.0001
Error	241	77.93282	0.32337		
C Total	245	123.48374			

Root MSE	0.56866	R-square	0.3689
Dep Mean	4.49187	Adj R-sq	0.3584
C.V.	12.65973		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.927681	0.26326880	7.322	0.0001
MSTU	1	0.175471	0.55332491	0.317	0.7514
SEXMSQ5	1	0.271919	0.11518198	2.361	0.0190
SEXFSQ5	1	0.265528	0.07626815	3.482	0.0006
QUES11	1	0.310607	0.05466861	5.682	0.0001

$QUES12 = a_0 + MSTU + SEXMSQ5 + SEXFSQ5 + QUES11 + E$

TEST SEXMSQ5 - SEXFSQ5

$QUES12 = a_0 + MSTU + QUES11 + E$

Numerator:	0.0008	DF:	1	F value:	0.0025
Denominator:	0.323373	DF:	241	Prob>F:	0.9598

Model: MODEL1
Dependent Variable: QUES12

TABLE 13

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	46.37454	15.45818	48.674	0.0001
Error	246	78.12546	0.31758		
C Total	249	124.50000			

Root MSE	0.56355	R-square	0.3725
Dep Mean	4.50000	Adj R-sq	0.3648
C.V.	12.52323		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	-0.174683	1.00513794	-0.174	0.8622
QUES5	1	1.405198	0.51351074	2.736	0.0067
Q5SQ	1	-0.141693	0.06255560	-2.265	0.0244
QUES11	1	0.300036	0.05269562	5.694	0.0001

$QUES12 = a_0 4 + QUES5 + Q5SQ + QUES11 + E$

TEST $Q5SQ = 0$

$QUES12 = a_0 4 + QUES5 + QUES11 + E$

Numerator:	1.6294	DF:	1	F value:	5.1305
Denominator:	0.317583	DF:	246	Prob>F:	0.0244

Model: MODEL1
Dependent Variable: QUES13

TABLE 14

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	56.62096	18.87565	60.408	0.0001
Error	247	77.17186	0.31244		
C Total	250	133.79283			

Root MSE	0.55896	R-square	0.4232
Dep Mean	4.43825	Adj R-sq	0.4162
C.V.	12.59417		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.538317	0.22535054	6.826	0.0001
MTEACH	1	0.072509	0.07139452	1.016	0.3108
QUES5	1	0.402423	0.06641013	6.060	0.0001
QUES11	1	0.245710	0.05230410	4.698	0.0001

$QUES13 = a_0 4 + MTEACH + QUES5 + QUES11 + E$

TEST $QUES5 = 0$

$QUES13 = a_0 4 + MTEACH + QUES11 + E$

Numerator:	11.4725	DF:	1	F value:	36.7196
Denominator:	0.312437	DF:	247	Prob>F:	0.0001

Model: MODEL1
Dependent Variable: QUES15

TABLE 15

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	58.81541	14.70385	48.243	0.0001
Error	246	74.97741	0.30479		
C Total	250	133.79283			

Root MSE	0.55207	R-square	0.4396
Dep Mean	4.43825	Adj R-sq	0.4305
C.V.	12.43902		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.097932	0.27654202	3.970	0.0001
MTEACH	1	1.308743	0.46608320	2.808	0.0054
SEXMTQ5	1	0.241090	0.08897963	2.710	0.0072
SEXFTQ5	1	0.514696	0.07780137	6.616	0.0001
QUES11	1	0.232914	0.05188008	4.489	0.0001

QUES13 = $a_0 + a_1$ MTEACH + SEXMTQ5 + SEXFTQ5 + QUES11 + E

TEST SEXMTQ5 = SEXFTQ5

QUES13 = $a_0 + a_1$ MTEACH + QUES11 + E

Numerator:	2.1944	DF:	1	F value:	7.2000
Denominator:	0.304786	DF:	246	Prob>F:	0.0078

Model: MODEL1
Dependent Variable: QUES13

TABLE 16

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	57.21224	14.30306	45.885	0.0001
Error	242	75.43553	0.31172		
C Total	246	132.64777			

Root MSE	0.55832	R-square	0.4313
Dep Mean	4.43320	Adj R-sq	0.4219
C.V.	12.59398		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.424149	0.25796130	5.521	0.0001
MSTU	1	0.242521	0.54298521	0.447	0.6555
SEXMSQ5	1	0.406460	0.11308665	3.594	0.0004
SEXFSQ5	1	0.414704	0.07479558	5.545	0.0001
QUES11	1	0.258535	0.05367107	4.817	0.0001

$QUES13 = a_0 4 + MSTU + SEXMSQ5 + SEXFSQ5 + QUES11 + E$

TEST $SEXMSQ5 = SEXFSQ5$

$QUES13 = a_0 4 + MSTU + QUES11 + E$

Numerator:	0.0014	DF:	1	F value:	0.0044
Denominator:	0.311717	DF:	242	Prob>F:	0.9472

Model: MODEL1
Dependent Variable: QUES13

TABLE 17

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	57.45421	19.15140	61.966	0.0001
Error	247	76.33862	0.30906		
C Total	250	133.79283			

Root MSE	0.55593	R-square	0.4294
Dep Mean	4.43825	Adj R-sq	0.4225
C.V.	12.52599		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	-0.321062	0.98954460	-0.324	0.7459
QUES5	1	1.374084	0.50527313	2.719	0.0070
Q5SQ	1	-0.118967	0.06152652	-1.934	0.0543
QUES11	1	0.243412	0.05198343	4.682	0.0001

$QUES13 = a_0 4 + QUES5 + Q5SQ + QUES11 + E$

TEST $Q5SQ = 0$

$QUES13 = a_0 4 + QUES5 + QUES11 + E$

Numerator:	1.1555	DF:	1	F value:	3.7388
Denominator:	0.309063	DF:	247	Prob>F:	0.0543

	MSTU	FSTU	MTEACH	FTEACH	QUES1	QUES2	QUES3	QUES4	QUES5	QUES6	QUES7	QUES8	QUES9	QUES10	QUES11	QUES12	QUES13	FCEST	FINSTE	QSSQ
MSTU	1.00000 0.0 250	-1.00000 0.0001 250	0.11741 0.0638 250	-0.11741 0.0638 250	0.16113 0.0196 248	-0.08784 0.1679 248	0.14976 0.0181 249	09734 .1298 250	-0.14798 0.0197 248	-0.15029 0.0174 250	0.10993 0.0026 249	-0.20630 0.0011 249	-0.16328 0.0099 249	0.18769 0.0052 245	-0.17818 0.0048 249	-0.00183 0.9871 249	-0. 0. 250	0.16761 0.0099 245	0.16857 0.0119 248	0.15186 0.0167 248
FSTU		1.00000 0.0 250	-0.11741 0.0638 250	0.11741 0.0638 250	0.16113 0.0196 248	0.08784 0.1679 248	0.14976 0.0181 249	09734 .1298 250	0.14798 0.0197 248	0.15029 0.0174 250	0.10993 0.0026 249	0.20630 0.0011 249	0.16328 0.0099 249	0.18769 0.0052 245	0.17818 0.0048 249	0.00183 0.9871 249	0. 0. 250	0.16761 0.0099 245	0.16857 0.0119 248	0.15186 0.0167 248
MTEACH			1.00000 0.0 254	-1.00000 0.0001 254	0.15166 0.0155 252	0.04712 0.4564 252	0.06960 0.2701 253	0.07788 .2161 254	0.12693 0.0441 252	0.05685 0.3669 254	0.12248 0.0517 253	0.02339 0.7112 253	0.04800 0.4472 253	-0.14490 0.0222 249	0.13567 0.0310 253	0.03642 0.5662 253	0. 0. 254	0.18774 0.0088 249	0.06704 0.2891 252	0.12205 0.0550 252
FTEACH				1.00000 0.0 254	-0.15766 0.0155 252	-0.04712 0.4564 252	-0.06960 0.2701 253	-0.07788 .2161 254	-0.12693 0.0441 252	0.05685 0.3669 254	-0.12248 0.0517 253	-0.02339 0.7112 253	-0.04800 0.4472 253	0.14490 0.0222 249	-0.13567 0.0310 253	0.03642 0.5662 253	-0. 0. 254	-0.18774 0.0088 249	-0.06704 0.2891 252	0.12205 0.0550 252
QUES1					1.00000 0.0 252	0.34980 0.0001 250	0.42921 0.0001 251	0.49959 0001 252	0.52939 0.0001 250	0.30587 0.0001 252	0.39981 0.0001 251	0.36851 0.0001 251	0.45454 0.0001 251	0.20542 0.0012 247	0.35087 0.0001 251	0.43972 0.0001 251	0. 0. 252	0.42978 0.0001 249	0.52260 0.0001 250	0.51665 0.0001 250
QUES2						1.00000 0.0 252	0.31944 0.0001 251	0.20653 0001 252	0.20420 0.0012 250	0.20287 0.0012 252	0.30286 0.0001 251	0.40699 0.0001 251	0.38288 0.0001 251	0.11589 0.0690 247	0.20461 0.0011 252	0.52639 0.0001 251	0. 0. 252	0.38052 0.0001 249	0.33216 0.0001 250	0.19789 0.0021 250
QUES3							1.00000 0.0 253	0.41254 0001 253	0.33129 0.0001 251	0.36968 0.0001 253	0.49166 0.0001 253	0.47054 0.0001 253	0.50457 0.0001 252	0.22001 0.0005 249	0.38355 0.0001 252	0.36985 0.0001 252	0. 0. 253	0.38178 0.0001 249	0.50267 0.0001 252	0.32908 0.0001 251
QUES4								1.00000 0 254	0.69983 0.0001 252	0.49257 0.0001 254	0.45292 0.0001 253	0.34205 0.0001 253	0.63118 0.0001 253	0.21735 0.0006 249	0.58390 0.0001 253	0.67252 0.0001 253	0. 0. 254	0.51359 0.0001 249	0.78255 0.0001 252	0.68078 0.0001 252
QUES5									1.00000 0.0 252	0.51764 0.0001 252	0.43267 0.0001 251	0.23950 0.0001 251	0.57437 0.0001 251	0.25328 0.0001 247	0.66966 0.0001 251	0.51882 0.0001 251	1.00000 0.0001 252	0.17803 0.0001 247	0.67908 0.0001 250	0.99519 0.0001 252
QUES6										1.00000 0.0 254	0.61164 0.0001 253	0.38135 0.0001 253	0.50730 0.0001 253	0.31719 0.0001 249	0.51584 0.0001 253	0.43419 0.0001 253	0.56614 0.0001 254	0.37918 0.0001 249	0.75514 0.0001 252	0.51988 0.0001 252
QUES7											1.00000 0.0 253	0.52765 0.0001 253	0.55140 0.0001 252	0.26243 0.0001 249	0.47414 0.0001 252	0.44547 0.0001 252	0.59489 0.0001 253	0.52005 0.0001 249	0.80471 0.0001 252	0.43527 0.0001 251
QUES8												1.00000 0.0 253	0.58140 0.0001 252	0.28517 0.0001 249	0.55680 0.0001 252	0.41658 0.0001 252	1.48661 0.0001 253	0.57106 0.0001 249	0.57867 0.0001 252	0.24077 0.0001 251
QUES9													1.00000 0.0 253	0.26371 0.0001 248	0.52727 0.0001 252	0.62708 0.0001 252	0. 0. 253	0.58927 0.0001 248	0.83061 0.0001 252	0.56309 0.0001 251
QUES10														1.00000 0.0 249	0.54400 0.0001 248	0.27876 0.0001 248	0. 0. 249	0.23533 0.0002 245	0.52499 0.0001 248	0.24970 0.0001 247
QUES11															1.00000 0.0 253	0.56615 0.0001 252	0. 0. 253	0. 0. 249	0.46492 0.0001 251	0. 0.0001 251
QUES12																1.00000 0.0 253	0. 0. 253	0.48533 0.0001 248	0.71365 0.0001 252	0.50328 0.0001 251
QUES13																	0. 0. 254	0.51369 0.0001 249	0.86169 0.0001 252	0. 0.0001 252
FCEST																		1.00000 0.0 249	0.62414 0.0001 248	0.35962 0.0001 247
FINSTE																			1.00000 0.0 252	0.67015 0.0001 250
QSSQ																				1.00000 0.0 251

MSTU= Male Students

FSTU= Female Students

MTEACH = Male Instructor

FTEACH = Female Instructor

Questions 1 - 13, See Appendix A

FCEST = Factor Evaluation of Classroom Structure

FINSTE = Factor Evaluation of Instruction

QSSQ = Question 5 Squared